

NON-PUBLIC?: N
ACCESSION #: 8801120338

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Calvert Cliffs, Unit 1 PAGE: 1 of 3

DOCKET NUMBER: 05000317

TITLE: Faulty 500KV Circuit Breaker Operation Leads to Loss of Nonemergency AC Power

EVENT DATE: 07/23/87 LER #: 87-012-01 REPORT DATE: 12/03/87

OTHER FACILITIES INVOLVED:

FACILITY NAME: Calvert Cliffs, Unit 2 DOCKET # : 05000318

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Kenneth L. Greene, Engineer, Licensing & Operational Safety
TELEPHONE #: 301-260-4385

COMPONENT FAILURE DESCRIPTION:

CAUSE: B SYSTEM: FK COMPONENT: 94 MANUFACTURER: GO80
REPORTABLE TO NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: At 1525 on July 23, 1987 a fault developed on one (Transmission Line 5052) of the two 500KV transmission lines connecting Calvert Cliffs Nuclear Power Plant to the company's bulk power distribution grid at Waugh Chapel Station. The circuit breakers for line 5052 at Waugh Chapel and Calvert Cliffs tripped to isolate the fault. In addition, circuit breakers at Calvert Cliffs for the other transmission line (line 5051) incorrectly tripped open. This resulted in isolating the generating plant from the power grid resulting in both reactors tripping on loss of load of all off site nonemergency AC power. All three Emergency Diesel Generators started automatically to power the vital 4KV buses. Emergency Operating Procedures 0 and 2 were initiated to place both reactors in a stable condition. At 1530 an Emergency Response "Alert" condition was declared. The event was downgraded to an "Unusual Event" at 1700 upon completion of a checkout of the 500KV switchyard. At 1723 off site electrical power was

provided to a vital 4KV bus from the alternate off site power line. Normal off site power was restored at 1910 via transmission line 5051.

The fault on transmission line 5052 was caused by a tree that came in contact with the transmission line. All trees in the area have been cut down to prevent recurrence. The cause of transmission line 5051 circuit breakers tripping incorrectly was determined to be the fault of a defective logic circuit card in the primary static relay panel. This circuit card allowed the relays to trip the circuit breaker despite the absence of a "Permissive Signal" from the corresponding relays at Waugh Chapel. This tripping function was disabled (tripping function protection provided by backup relays) upon restoring transmission line 5051 to service. The tripping function was subsequently restored after swapping the repaired logic assembly with one from another location in the power grid.

(End of Abstract)

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On July 23, 1987 both Unit One and Unit Two reactors at Calvert Cliffs were operating at 100% power. At 1525 a phase to ground fault developed on phase "C" on one (transmission line 5052) of the two 500KV transmission lines connecting Calvert Cliffs to Baltimore Gas & Electric's (BG&E) bulk power distribution power grid at Waugh Chapel Station. The fault developed when a tree came in contact with the transmission line. Circuit breakers (EIIS FK-52) (Model: General Electric Type ATB-550-3) for this line at Waugh Chapel and Calvert Cliffs tripped open to isolate the fault. At approximately the same time the circuit breakers at Calvert Cliffs for the other 500KV transmission line (line 5051) incorrectly tripped upon sensing the fault. A defective logic circuit card in the primary static protective relay circuit (EIIS FK-94) allowed the primary relays to trip the circuit breakers at Calvert Cliffs despite the absence of a permissive signal to trip from associated relays at Waugh Chapel. The circuit breakers at Waugh Chapel remained shut, as designed, after having determined that the fault was on another transmission line.

The opening of circuit breakers on both 500KV transmission lines isolated Calvert Cliffs from the rest of the company's power grid. This resulted in both Unit One and Unit Two reactors tripping on a loss of load followed immediately by a loss of all nonemergency AC power. All three of the site's Emergency Diesel Generators (EDG) (EIIS EK-DG) started automatically on receipt of an undervoltage signal on the engineered safety features 4KV buses (EIIS EB). EDG #11 and #21 automatically energized 4KV buses #11 and #24 respectively while EDG #12 was selected by the operators to energize 4KV bus 14. Emergency Operating Procedures 0 and 2 were initiated on both Units to place the reactors in a stable condition. Natural circulation was observed on both reactors.

At 1530 an Emergency Response "Alert" condition was declared to assist in

the recovery from loss of all off site electrical power. The alert condition was downgraded at 1700 to an unusual event after completion of a check of the 500KV switchyard. At 1723 alternate off site electrical power was established to engineered safety features 4KV bus #21 from the Southern Maryland Electric Cooperative (SMECO) 13KV line. Establishment of this electrical power was delayed due to a trip of the SMECO circuit breaker at their 69/13KV substation

while the operators were initially energizing the unloaded 13KV/4KV transformer. Although the exact cause of the breaker trip is unknown, operators failed to open the warehouse breaker off of the SMECO line, as required in the operating instructions. The warehouse breaker was subsequently opened and the SMECO line was reenergized and power was brought to the 4KV bus without incident. A review of the operation and design of the SMECO line has been initiated.

After a checkout of transmission line 5051, permission was given by BG&E's Electric System Operations Department to allow reestablishment of off site power by transmission line 5051. At 1910 normal off site electrical power was reestablished to the 500KV/13KV service transformers. Operators commenced reestablishment of normal electrical lineup for both units. At 2010 the "Unusual Event" condition was terminated. Forced circulation in both reactors was restored at approximately 2045.

Unit Two'

plant was returned to service with the unit being paralleled to the power grid at 0855 on July 24, 1987. Restoration of the Unit One plant was delayed due to #11A Reactor Coolant Pump (RCP) Motor (EIIS AB-MO) failing during initial restarting after the trip. Cause of the RCP Failure was an internal fault in the motor winding. Further troubleshooting on the exact cause is ongoing. #11A RCP motor was changed out and Unit One was restored to power on August 5, 1987.

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Operators experienced some difficulty during this event while starting the Steam Driven Auxiliary Feedwater Pumps (EIIS-BA-P) (Model: Terry Turbine Type GS-2) in order to minimize EDG electrical loading. The initial two attempts to start #11 AFW pump failed due to high vibration levels which caused the pumps trip latch mechanism to trip. #11 AFW pump was successfully started by reducing steam flow to the governor control valve and manually bringing the steam flow up slowly. Subsequent troubleshooting the next day with the turbine's vendor technical representative revealed the overspeed trip linkage was out of adjustment. This linkage was adjusted and the pump was tested satisfactorily.

Troubleshooting efforts on transmission line 5051 circuit breakers isolated the cause to be a defective logic circuit card in the primary static protective relay panel at Calvert Cliffs. Upon restoring off site power to Calvert Cliffs via transmission line 5051, certain tripping functions of the

primary relays for this line were disengaged to prevent a recurrence of inadvertent tripping. At that time protective tripping was by the backup electro-mechanical relays. The defective logic card was subsequently repaired and the entire assembly containing this card was switched with a similar assembly from another location on the power grid. After the assembly was replaced, the primary relay's tripping function was restored. Although the Company's relay Preventive Maintenance Programs meets the Pennsylvania, New Jersey, Maryland Power Grid (PJM) Requirements, it will be reviewed to ensure its adequacy. Following the loss of nonemergency AC power, the 500KV transmission lines between Calvert Cliffs and Waugh Chapel were inspected by helicopter and on foot. The tree which caused the fault was discovered on July 24 and trees in the area of the fault were cut down to prevent a recurrent event. Following this maintenance work, transmission line 5052 was cleared for use by the Electric Systems Operation Department and was returned to use on July 25. A review of tree trimming operations will be done to minimize the possibility of a similar event.

Occurrence of this event does not constitute a major safety issue as loss of all nonemergency AC power is evaluated in Section 14.10 of the updated Final Safety Analysis Report (FSAR). This event was analyzed for occurrence at 100% power and, as such, this event could not have been more severe under any credible alternative circumstances. The parameter trends were not as severe, in this event, as those assumed in the FSAR analysis.

A review of Licensee Event Reports (LER) at Calvert Cliffs revealed one event which involved loss of offsite power. The event is documented in LER 78-20.

The contact for this event is Kenneth Greene at (301) 260-4385.

ATTACHMENT # 1 TO ANO # 8801120338 PAGE: 1 of 1

BALTIMORE
GAS AND
ELECTRIC

CHARLES CENTER P.O. BOX 1475 BALTIMORE, MARYLAND 21203

JAMES R. LEMONS
Manager
Nuclear Operations Department

January 4, 1988

U.S. Nuclear Regulatory Commission Docket No. 50-317
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Washington, DC 20555

Dear Sirs:

The attached LER 87-012, Revision 1 is being sent to you as required by 10 CFR 50.73.

Should you have any questions regarding this report, we would be pleased to discuss them with you.

Very truly yours,

/s/ J R Lemons

J. R. Lemons

Manager - Nuclear Operations Department

JRL:KLG:plv

cc: William T. Russell

Director, Office of Management Information and Program Control

Messrs: J.A. Tiernan

W.M. Lippold

*** END OF DOCUMENT ***
